

Design Description Document

Each selected DIME team needs to convey information to NASA for engineers and scientists to evaluate the team's experiment apparatus concept. Such an evaluation is important in two regards; one, to ensure safe operation of the experiment in the drop tower, and two, to help ensure successful experiment operations. The information provided is similar to what NASA engineers prepare for experiments for the 2.2 Second Drop Tower or for the International Space Station.

Remember that the team's experiment design needs to conform to the requirements stated in the DIME Experiment Requirements Document available from a DIME CD-ROM or from the DIME web page.

This list of information needs to be provided in a **Design Description Document**. As the design itself is developed from January through April, so is the **Design Description Document**. This document also serves to communicate the design concepts between the team members. The design document is submitted to NASA each month for evaluation and guidance back to the team. One copy of the design document should be sent by fax, e-mail, or postal mail to the address given separately. Be sure to retain a copy for your records.

Please include the following items in the **Design Description Document**. If an item below is not applicable to the team's experiment (e.g. no fluids), simply state that it is not applicable. Use this numbering system for the sections of the **Design Description Document**.

1. **TITLE PAGE** - Include a title page which indicates the team's identification, experiment name, preparation date, etc.
2. **SCIENCE** - Provide some material from your team's proposal to summarize the science aspects of the experiment. Include a one or two sentence summary of the hypothesis or research objective. Indicate the range of samples and/or conditions for testing. Identify explicitly what measurements will be made to verify the hypothesis or to answer the team's research question.
3. **DRAWING** - Provide a detailed, labeled drawing of the apparatus as mounted for operations on the NASA-provided Mounting Adaptor Plate. Dimensions (with units) and locations of the major components should be shown. Include the Mounting Adaptor Plate in the drawing.
4. **MATERIALS** - A list of materials with type and quantity (and/or thickness) for all experiment components must be included. Don't forget the sample materials (if any) of the experiment, such as cotton combustion fuel or ginger ale fluid.
5. **HAZARDOUS CHEMICALS** - State that no dangerous or hazardous chemicals are used. Identify what (if any) chemical reaction products are created. If there is a question about the acceptability of a particular material or chemical reaction product, discuss it with your team's NASA mentor right away rather than waiting to include it in the design document.
6. **FASTENERS** - Indicate size and type of fasteners (e.g. bolts, nuts, and screws) to be used in the construction of the major components. (Bear in mind the Mounting Adaptor Plate has standard $\frac{1}{4}$ -20 threaded holes.)
7. **FLUIDS** - Describe how fluids are contained within the experiment apparatus.

8. SURVIVAL - Describe design features that ensure survival of apparatus after impact of repeated drops. Please describe how you provide secondary containment for your fluids in case of a leak in the primary container.
9. MASS - Prepare a table with the mass (use consistent units) of all components of the experiment apparatus. This table should include all experiment fluids, samples, wires, connectors, Mounting Adaptor Plate, etc. Ensure that the total mass is less than the limit specified in the DIME Experiment Requirements Document.
10. PROCEDURE - Provide a step-by-step procedure to prepare your team's experiment apparatus for a drop in the drop tower during DIME Drop Days. This should include the steps necessary to initially prepare the experiment in a laboratory as well as any steps immediately before the experiment is dropped. In addition, any action needed AFTER the experiment is released to fall should be included in this procedure. The DIME Educational Rig, which is used to carry the experiment, has a time delay relay which may be used to initiate an action a programmable time after the experiment is released in the drop tower. See the DIME Experiment Requirements Document for more details. The steps necessary to recover the data from the experiment after the drop is complete should also be included.
11. ELECTRICAL DIAGRAM - Provide an electrical circuit diagram of your experiment with identification of each component. Include wire sizes (i.e. wire gauge) and fuse sizes. Ensure adequate length of cable to the power connectors (see the DIME Experiment Requirements Document). The electrical connectors which plug into the Educational Rig are provided by NASA. All other electrical components are to be supplied by the team.
12. TIME DELAY - If the time delay relay will be used, specify the required time delay which can be from 0.1 second to 102.3 seconds in 0.1-second increments,.
13. DATA LOGGER - Specify the connections to the (optional) electronic data logger for the analog and/or digital signals and the ground.
14. ADDITIONAL INFORMATION - Optional information can be added to further illustrate the design. Photographs of prototype and/or finished equipment may be included. Results of testing may be included.

A preliminary Design Description Document is to be submitted on or before February 1 and a final Design Description Document is due on or before March 1. Comments will be provided by NASA after review of each document submission.

An 'as-built' Design Description Document which reflects the final, 'as-built' experiment design needs to accompany the experiment when the experiment is shipped to NASA in by April 1. These successive documents are refinements of the previous version.

Questions on these instructions may be addressed to your NASA mentor or another DIME staff member.